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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2017/022

2016 STOCK STATUS UPDATE OF LOBSTER (*HOMARUS AMERICANUS*) IN THE BAY OF FUNDY (LOBSTER FISHING AREAS 35-38)

Context

The status of the lobster resource in the Bay of Fundy (Lobster Fishing Areas [LFAs] 35-38) to the end of the 2011-12 seasons was assessed in February 2013 (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) and has been updated annually since 2014 (e.g. DFO 2014). It will be assessed again in 2018 as per the multi-year assessment schedule. Fisheries Management has requested "interim information on the status of LFAs 35-38 lobster stocks to maintain the scientific basis for management advice consistent with DFO's Precautionary Approach (PA)". The PA defined in the 2013 assessment identified three key indicators that capture changes in lobster abundance and biomass, and proposed reference points for each indicator. This Science Response updates these indicators to the end of the 2014-15 fishing season.

This Science Response Report results from the Science Response Process of September 16, 2016, on the Stock Status Update of American Lobster in Lobster Fishing Areas (LFAs) 35-38.

Background

Description of the Fishery

Commercial lobster fishing in LFAs 35-38 takes place in the Bay of Fundy (Figure 1) and borders the two biggest lobster fisheries in the Northwest Atlantic: LFA 34 which has the highest landings (approximately 24,000 metric tonnes (mt); DFO 2016) and the most participants of any LFA in Canada, and Downeast Maine, USA (Hancock and Washington Counties), with annual landings averaging approximately 30,000 mt since 2012 (Historical Maine DMR Fisheries Landings Data). Landings in LFAs 35-38 began a long-term increase in the mid-1990s and current landings are at record highs. This increase in landings occurred in most of the Gulf of Maine regions as well as many other lobster stocks in Atlantic Canada.

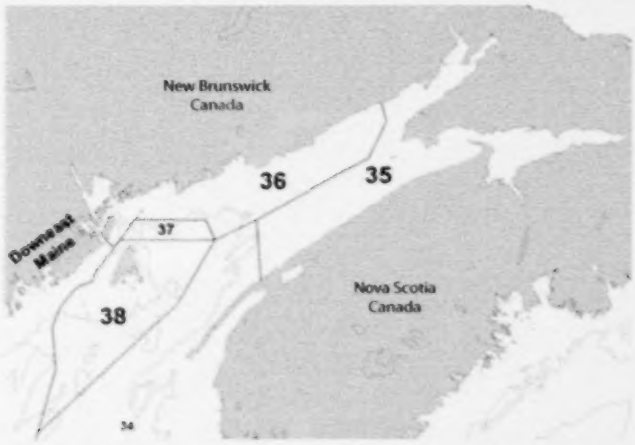

Figure 1. Lobster Fishing Areas (LFAs) 35-38 in the Bay of Fundy. LFA 37 is a shared fishing area between LFAs 36 and 38.

The fishery is managed by input controls including a minimum legal size (MLS) (82.5 mm carapace length), prohibition on landing of both egg-bearing and V-notched (with no setal hairs) females, limited entry, fishing seasons and trap limits. Fishing seasons and traps limits differ among LFAs (Table 1). Other management measures include the requirement of vents to allow sublegal sized lobster to escape, and biodegradable trap mechanisms to mitigate ghost fishing by lost traps.

Table 1. Number of total licences, trap limits and fishing seasons for each Lobster Fishing Area (LFA) within the Bay of Fundy. Note that LFA 37 is a shared fishing area where fishermen from LFAs 36 and 38 are authorized by licence condition to fish.

LFA	Licences*	Traps Limits	Fishing Seasons
35	95	300	Fall: October 14th – December 31st Spring: Last day February – July 31st
36	177	300	Fall: 2nd Tuesday in November – December 31st Spring: March 31st – June 29th
38	136	375	2nd Tuesday in November – June 29th

* as of January 28, 2013 (see Tremblay et al. 2013 for the different categories)

Analysis and Response

The LFA 35-38 assessment (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) provided a full analysis of stock health by describing fishery performance and providing indicators for abundance and biomass, fishing pressure and reproduction. Spatial variation of these indicators was evaluated. With regard to the PA, three primary indicators were identified and reference points were tabled. The rationale for these indicators was documented at a Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). The first biomass indicator was based on landings. It was recognized that using landings as the sole indicator of lobster stock status has risks, and one of the goals of the 2013 assessment (DFO 2013) was to provide potential alternatives. Two additional stock indicators and associated reference points related to

abundance were proposed and have subsequently been adopted. The commercial catch rate indicator is related to the abundance of the legal portion of the stock. This indicator is calculated as total landings/total trap hauls from complete records of the fishermen logbooks. The other indicator, related to population abundance, is based on the stratified mean of number of lobsters per tow in a fishery-independent trawl survey (summer Research Vessel [RV] Survey). The status of these indicators and Upper Stock References (USR) are provided below.

Landings and Catch Rate

An upward trend in landings has been recorded for the past 2 decades (1994-95 to 2014-15) in all 3 LFAs and 2014-15 landings are the highest on record for the Bay of Fundy at 12,280 mt (Figure 2). Compared to the previous year, landings increased in LFA 36 (5%) and 38 (20%) and decreased in LFA 35 (5%). Despite this decrease, landings in LFA 35 are the second highest on record. The USR for the biomass of legal lobsters based on landings is defined as 80% of the median for the period 1984-85 to 2008-09, which corresponds to 1,575 mt. The metric for assessing stock status relative to the USR is the 3-year moving average of landings. For the fishing year 2014-15, the 3-year moving average was at 10,777 mt, nearly 7 times the USR. By this measure, the LFAs 35-38 lobster stock is in the healthy zone.

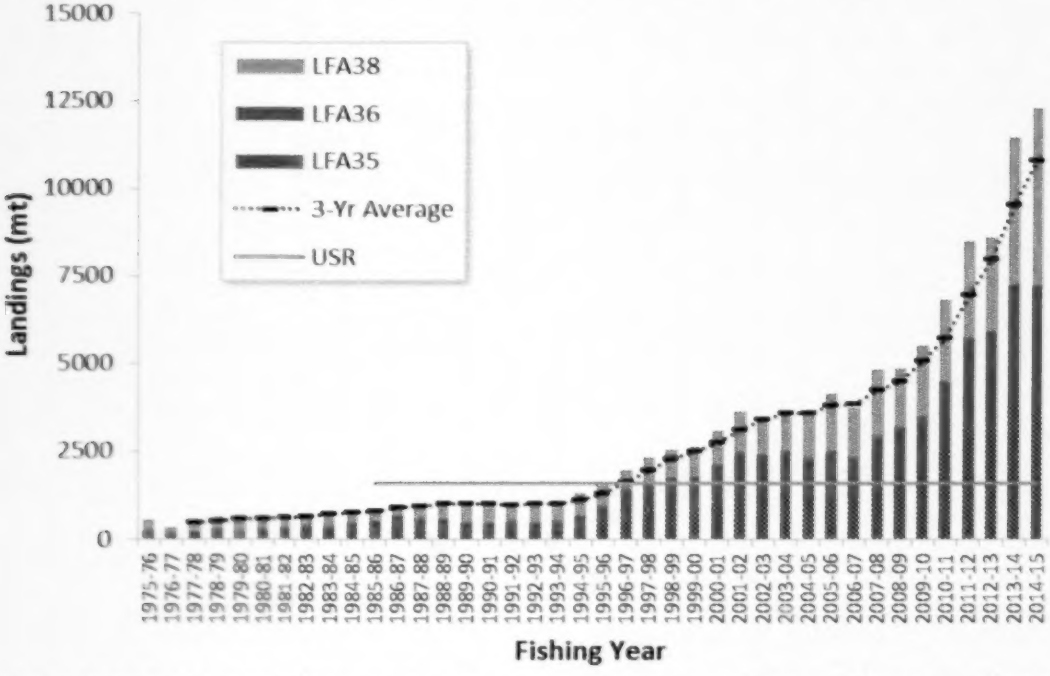

Figure 2. Lobster landings by fishing year from the commercial fishery in Lobster Fishing Areas (LFAs) 35-38 from 1975 to summer 2014. Fishing year encompasses the fall through the early summer of the following year. The red horizontal line is the landings based Upper Stock Reference for the LFAs 35-38 as a whole (1575 mt). The black dashes with the dotted line are the 3-year moving averages for LFAs 35-38 landings.

The commercial Catch-Per-Unit-Effort (CPUE, in kg/trap haul) has increased since 1998-99 and the 2.34 kg/trap haul for 2014-15 is the second highest on record. The USR for the biomass of legal size lobsters based on the CPUE (0.58 kg/trap haul) is defined as 50% of the median for

the reference period 2005-06 to 2008-09. As with landings, the measure for assessing where the CPUE is relative to the USR is the 3-year moving average of the commercial CPUE. The most recent 3-year moving average is 2.20 kg/trap haul, nearly four times the USR (Figure 3).

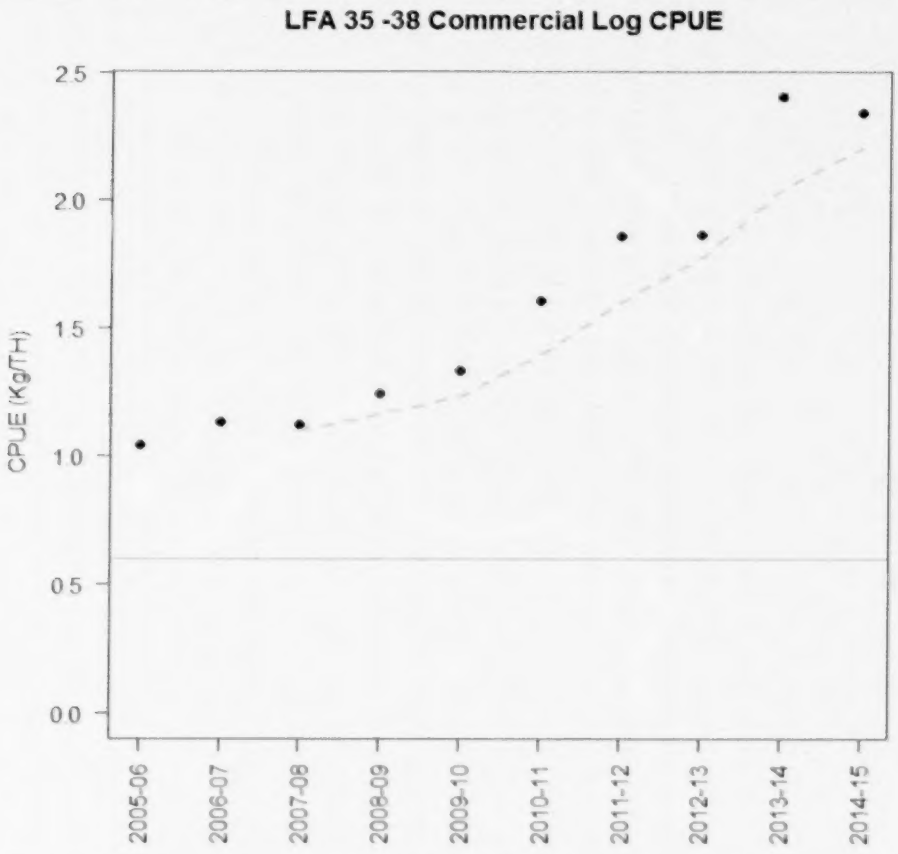

Figure 3. Trend in commercial Catch-Per-Unit-Effort (CPUE; total weight landed/total trap hauls) per fishing year calculated from complete entries of fishermen logbooks. Upper Stock Reference is the horizontal solid blue line (0.58 kg/trap haul). Orange dashed line is the 3-year moving average.

Fishery-independent Survey

The fishery-independent indicator proposed in the last assessment (DFO 2013) was based on lobster catch rate (number of lobsters/tow) from the summer RV survey in strata 490-495 (Figure 4). The USR for lobster abundance based on this survey was 80% of the median catch rate for the period 1985-2009, which correspond to 1.9 lobsters per tow. As for the previous USRs, the 3-year moving average was used as the metric to assess stock status. In 2014-15, the estimated 3-year moving average was 59.5 lobsters per tow, more than 30 times greater than the USR (Figure 5). This survey does not sample in depths shallower than 50 metres in the Bay of Fundy, which are highly productive lobster areas. The observed annual variability in average catch rates is likely related to low sampling intensity.

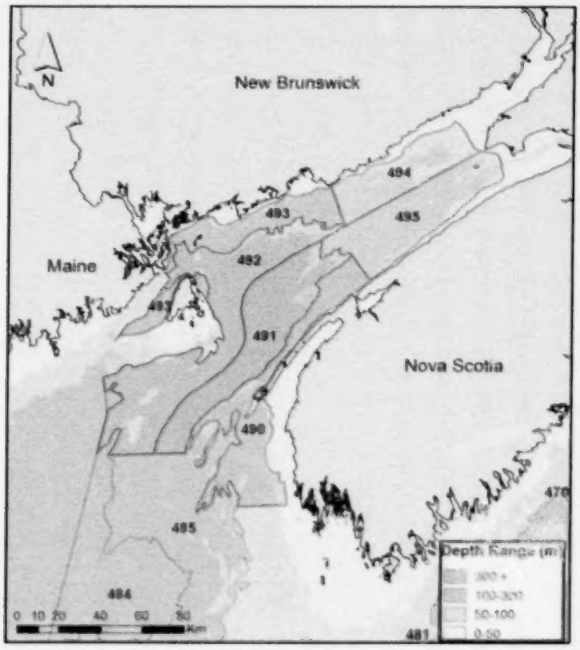

Figure 4. Summer Research Vessel survey strata in NAFO Division 4X. Data compiled to assess lobster stock status in Lobster Fishing Areas (LFAs) 35-38 are from Strata 490 to 495 inclusively (n=6).

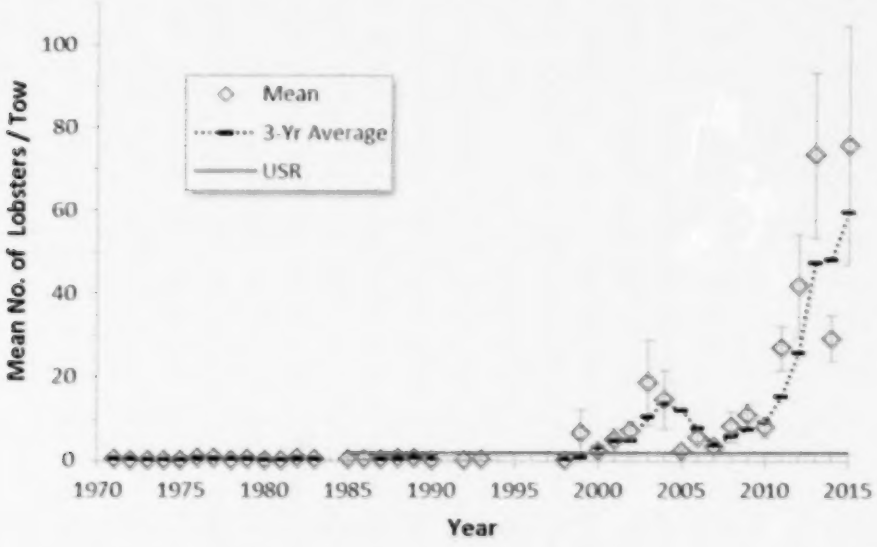

Figure 5. Stratified mean number of lobsters per tow (±SE (Standard Error)) in Lobster Fishing Areas (LFAs) 35-38 from summer Research Vessel (RV) survey (Strata 490-495) calculated by averaging the mean catch rates of the 6 strata covering the Bay of Fundy. Black dashes with dotted line are the 3-year moving averages. Red solid line is the Upper Stock Reference (USR) set at 1.9 lobsters per tow. Note: Years with no symbols (e.g. 1994-1997) had no lobster counts available; lobster total weights were normally recorded but lobster counts were not estimated from those weights in this assessment update.

Conclusions

At the end of the 2014-15 fishing year, the lobster stock in LFAs 35-38 was in the healthy zone based on 3 stock indicators (landings, commercial catch rate and summer RV survey catch rate). The 3-year running averages of these indicators were above the USRs.

Each of the stock indicators has strengths and weaknesses that were outlined in the previous assessment. Given that all three are providing similar signals, there is confidence that overall abundance and biomass remain high relative to the 1994-2009 period. However, because size-at-50%-onset-maturity in the Bay of Fundy occurred at a large size (> 90mm CL) while MLS is at 82.5 mm CL, the three primary indicators provided herein monitor a large segment of the population that are immature lobsters (see Gaudette et al. 2014). Therefore, abundance trends presented here are not necessarily reflecting the broodstock trend and are likely influenced by recruitment regimes.

Moving forward, monitoring broodstock abundance as a primary indicator would increase our ability to assess long-term risk of recruitment overfishing.

Contributors

Julien Gaudette (Lead)	DFO Science, Maritimes
Adam Cook	DFO Science, Maritimes
Cheryl Denton	DFO Science, Maritimes
Leslie Nasmith (Reviewer)	DFO Science, Maritimes
Don Clark (Reviewer)	DFO Science, Maritimes
Lottie Bennett	DFO Science, Maritimes
Sara Quigley	DFO Resource Management, Maritimes

Approved by

Alain Vézina
Regional Director of Science
DFO Maritimes Region
Dartmouth, Nova Scotia
Ph. 902-426-3490

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Center for Science Advice (CSA)
Maritimes Region
Fisheries and Oceans Canada
Bedford Institute of Oceanography
1 Challenger Drive, PO Box 1006
Dartmouth, Nova Scotia B2Y 4A2

Telephone: 902-426-7070
E-Mail: XMARMRAP@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

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